Candidate Name	Centre Number	Candidate Number

WELSH JOINT EDUCATION COMMITTEE
General Certificate of Education
Advanced Subsidiary/Advanced

WJEC CBAC

CYD-BWYLLGOR ADDYSG CYMRU
Tystysgrif Addysg Gyffredinol
Uwch Gyfrannol/Uwch

311/01

BIOLOGY

MODULE BI1

A.M. MONDAY, 6 June 2005

(1 hour 30 minutes)

For Examiner's Use Only

Total Marks	

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

The quality of written communication will affect the awarding of marks.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

1. (i) Draw and label a simple diagram of a ribosome. [2]

(ii) What **two** chemical components make up a ribosome? [2]

1 .....

2 .....

(iii) On which membranous structure in a cell would you expect to find ribosomes? [1]

.....

(iv) What is the function of ribosomes? [1]

.....

(v) State precisely where in a cell ribosomes are synthesised. [1]

.....

(Total 7 marks)

2. (i) Fill in the table below to indicate the structural differences between triglycerides (lipids) and phospholipids. [3]

	Triglyceride	*Phospholipid*
Structural difference 1		
Structural difference 2		
Where compound occurs in organisms		

(ii) Stearic acid and oleic acid are both examples of fatty acids. Each contain 17 carbons in the hydrocarbon chain.

Stearic acid is a saturated fatty acid.

Oleic acid is an unsaturated fatty acid.

How would the structure of these two fatty acids differ? [1]

.....

.....

(iii) A high intake of which of these fatty acids might be a contributory factor in heart disease? [1]

.....

(Total 5 marks)

3. The diagram below shows the results of a test which can be used to analyse evidence left at the scene of a crime. This can then be compared with samples taken from various suspects.

(a) (i) What is the name given to this technique? [1]

.....

(ii) State **two** types of evidence left at the scene of the crime which may have been used to provide the DNA sample. [1]

1 .....

2 .....

(iii) Which suspect has been incriminated by the results? [1]

.....

(iv) Give a reason for your answer. [1]

.....

(b) Briefly describe the part played by the following in the technique:

(i) restriction endonuclease; [1]

.....

(ii) gel electrophoresis. [1]

.....

(c) Other than criminal investigations, give another situation where this technique is used. [1]

.....

(Total 7 marks)

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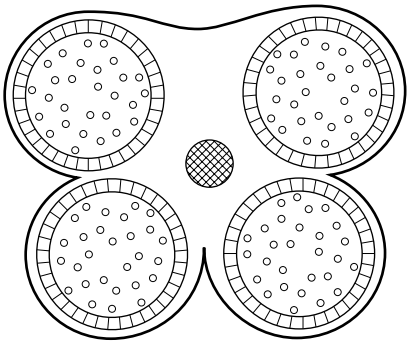
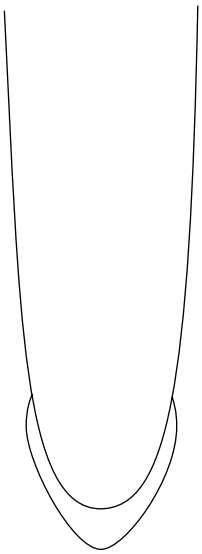
4. Below are two diagrams showing parts of a plant.





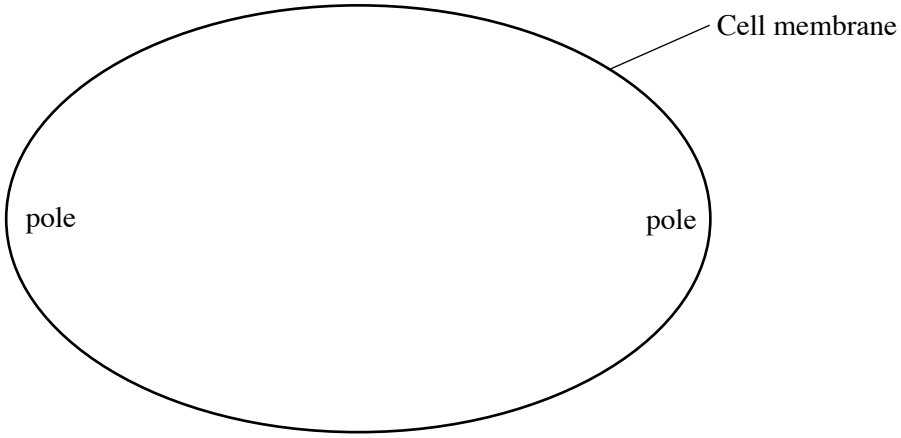
(a) (i) On **each** diagram draw a large cross to show the areas of cell division. [2]

(ii) In the boxes provided, name the type of cell division taking place. [2]

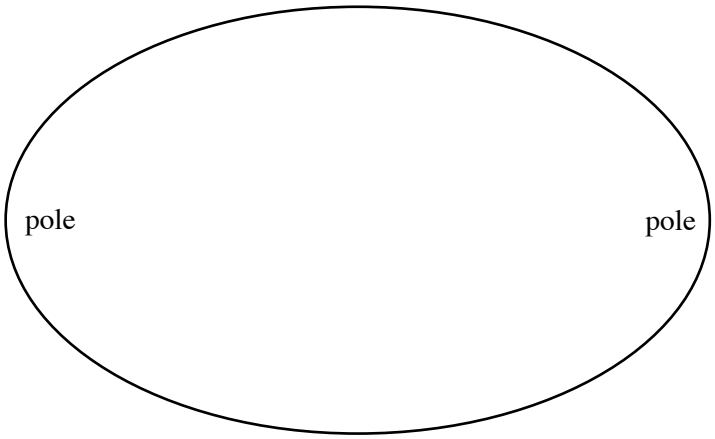
(b) (i) Complete the three diagrams on page 7, to show the arrangement of chromosomes at the named stages of cell division in an animal cell.
The original cell contained **2 pairs of chromosomes.** [3]

(ii) Label on any appropriate diagram
1. A centriole
2. A centromere
3. A bivalent [3]

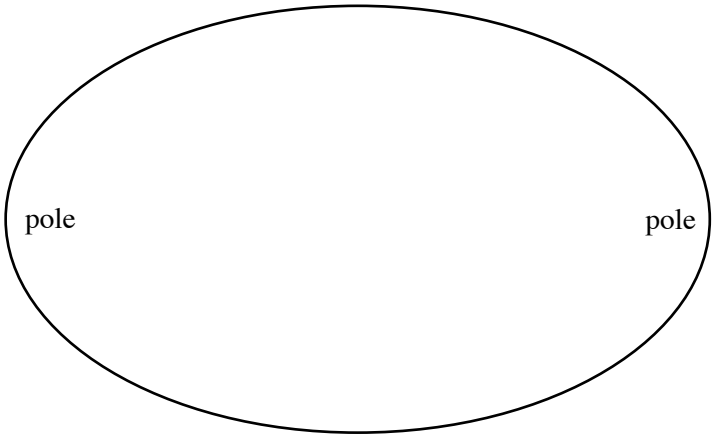
Metaphase of mitosis



Metaphase I of meiosis



Metaphase II of meiosis



(Total 10 Marks)

5. Beetroot cells contain a red pigment.
Cut cubes of beetroot were washed to remove the red pigment from damaged surface cells.
The cubes were placed in test tubes containing 10cm^3 water, in waterbaths at a range of temperatures.
The tubes were left at each temperature for 10 minutes.
The beetroot was removed from the tubes and the colour of the solution in the tube measured on a colorimeter.
The darker the red colour of the solution, the greater the colorimeter reading.
The following results were obtained.

	Temperature (°C)						
	10	*20*	*30*	*40*	*50*	*60*	*70*
Colorimeter Reading (Arbitrary units)	0	1	4	7	80	90	100

(i) Describe the pattern of results from the above table. [2]

.....

.....

.....

(ii) Explain the results as fully as you can. Refer to cell membrane structure in your answer. [3]

.....

.....

.....

.....

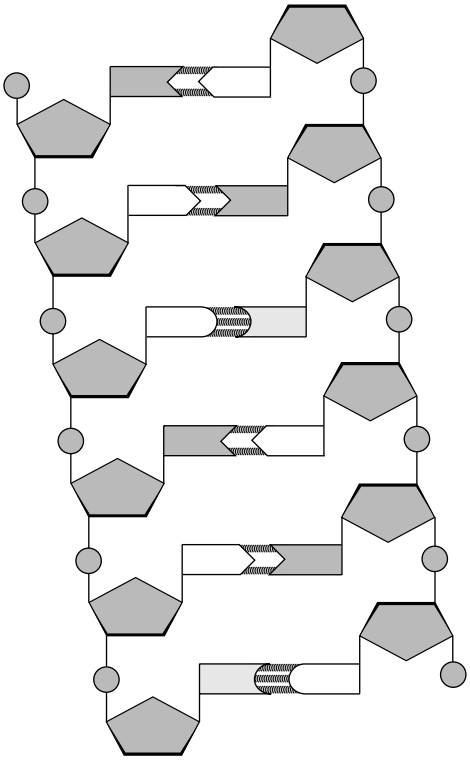
(iii) Explain the difference in the results if you were investigating the effect of ethanol on the permeability of the membrane. [1]

.....

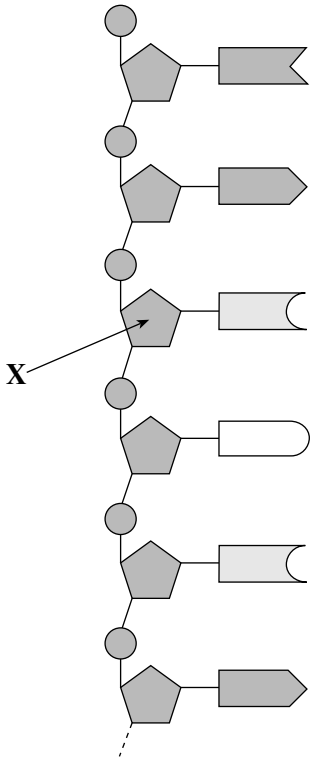
(Total 6 marks)

6. The diagrams below represent two biological molecules.

A



B



(a) (i) Name molecules **A** and **B**. [1]

A .....

B .....

(ii) Name **X**. [1]

.....

(iii) Where in the cell would you find molecule **A**? [1]

.....

(iv) Name the bond that holds the two strands together in **A**. [1]

.....

(v) Give **one other** structural difference, not illustrated in the diagram, between the two molecules **A** and **B**. [1]

.....

.....

(b) Erwin Chargaff recognised that there were four types of bases in the nucleic acid found in the nucleus. The table below shows the results of his experimental work.

Source of nuclear material	*% adenine*	*% guanine*	*% cytosine*	*% thymine*
wheat	27.3	22.7	22.8	27.1
broad bean	29.7	20.6	20.1	29.6
salmon	29.7	20.8	20.4	29.1
bull	28.6	22.2	22.0	27.2
human	30.9	19.9	19.8	29.4

Source: Chargaff, E. (et al.) 1953, *Nature,* London, no. 172, p.289

(i) What conclusions did Chargaff draw from this data about the pairing of bases in the nucleic acids of various species? [1]

.....

.....

(ii) Using the data from the table above, explain how he came to his conclusion. [1]

.....

.....

(iii) What category of bases are adenine and guanine? [1]

.....

(Total 8 marks)

7. Milk can be made lactose-free by passing it down a column of the immobilised enzyme lactase. An experiment was carried out to determine the optimum size of alginate beads to use in this process.
Three bead sizes were prepared and placed in columns. The same volume of milk was run into each column at the same rate of flow.
The percentage product for each experiment was determined.
The entire experiment was repeated a number of times.

	Bead diameter (mm)		
	2	*4*	*6*
Mean percentage of product	98	84	70

(a) (i) Suggest the bead size which should be used in the process. Give a reason for your answer. [1]

.....

.....

(ii) Give **two** reasons for the different results from the three bead sizes. [2]

.....

.....

.....

(iii) What would you expect to happen to the results if the flow rate was decreased? Explain your answer. [1]

.....

.....

(iv) Which **other** factor should be kept constant during the experiment? [1]

.....

(b) Name the **two** monosaccharides produced by the breakdown of lactose. [1]

.....

(c) Give **two** advantages of using immobilised enzymes in industrial processes. [2]

1 .....

2 .....

(Total 8 marks)

8. Recent progress has been made towards effective treatment for cystic fibrosis. The key problem remains developing an effective delivery system to introduce the replacement gene into the cells. One delivery system is a virus which is known not to cause disease in humans.

(a) What are the **two** major components of a virus? [2]

1 .....

2 .....

(b) What term is given to the type of treatment described above? [1]

.....

(c) Briefly describe another delivery system which could be used to introduce the gene to the lung cells. [3]

.....

.....

.....

.....

.....

(d) Which events must occur once the replacement gene is inside the lung cell for the treatment to be successful? [2]

.....

.....

.....

(e) State **one** hazard of introducing a gene into the lung tissue to correct cystic fibrosis. [1]

.....

(Total 9 marks)

9. Answer **one** of the following questions.
Any diagrams included in your answer must be fully annotated.

Either, *(a)* Describe the structure and function of enzymes. Explain how their activity is influenced by pH, temperature and inhibitors. [10]

Or *(b)* Describe how DNA replicates and give an account of its role in transcription. [10]

Examiner only
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Total 10 marks